

Abstract

This invention describes a method to generate large numbers of spot beams for multiple-beam satellite systems using smaller apertures. This is done by dividing the basic spot beam that has 3 to 4 dB of gain drop within the beam into a number of smaller 1- dB sub-beams. This has the effect of reducing the required peak gain for the antenna by 2 - 3 dB, thus reducing its size by as much as 50%. The frequency band allocated to the basic beam will be divided among the sub-beams. However, the frequency re-use among the basic beams can be maintained. Frequency allocations have to be coordinated among all beams.

This concept is especially applicable to phased arrays using digital beam formers. The DBF complexity is a function of the number of array elements, and is less dependent on the number of beams. Reducing the array size, and consequently reducing the number of elements helps in reducing the complexity, power and mass of the DBF.